NEWS **SCIENCE** NEWS

THE SECRETS OF CHARGED BARRIER TECHNOLOGY

by Bill Fogal ©1997

The Fogal Semiconductor

We are only bound by the limits of our own imagination. We perceive what we cannot see. We feel what we cannot hear. We strive for perfection in our thought models, but we seem to forget that sometimes it is the imperfection in nature that can help make things work.

This paper covers a new way of thinking in solid state physics. Now, one seeks to utilise and tame pure energy flow rather than just broadly dissipate the collected energy by means of electron current flow. This paper also looks at some of the ideas and theories that make up our world.

The Fogal Semiconductor, which is an experimentally demonstrated device, may force us to ask some unique questions about conventional electromagnetic (EM) theories, and wonder, "Do things really work that way? Could they work differently after all?"

I particularly caution the reader against simply assuming normal EM theory, either classical or quantal, as having the 'final answer'. The topology of these models has been severely and arbitrarily reduced. If one looks at circuits in a higher topology algebra, many operations are possible, though excluded from present tensor analysis.

Flowing Energy Fields

Have you ever taken two magnets and held one magnet in each hand with the magnets facing each other with the same poles? As you bring the magnets close to each other, you can feel the repulsion and the build-up of the 'energy field' as the magnets begin to push your hands away from each other. Each of the magnetic poles is pouring forth hidden energy that acts upon the other pole, producing the force that you feel.

That energy is continuously flowing from the magnets and fills the entire space around them, literally to the ends of the universe.

The electron also has such a flowing energy field, and electrons will react just like the magnets under certain conditions. When two like charges approach each other, their streams of energy impact one upon the other, producing (i) excess pile-up of energy on the electrons, and (ii) mutual repulsion.

However, unlike the magnets, the electrons are usually notoriously free to move. So, free electrons will rapidly move away from the site of repelling charges.

As electrons mutually repel each other and move away, they also drain away the collected portion of their excess energy field in the process.

Now if we could only collect and use the energy from the flowing energy field directly, further down the circuit, and not move the repelling electrons themselves! In that case, our constrained electrons would continue to be an inexhaustible *source* of that energy flow, and we could collect and use the excess energy from them without draining away the source by allowing electron current flow from it.

And there'd be another great advantage. We would also rid ourselves of most of the electron collision noise that is created in the lattice by the longitudinal movement of the electrons as ordinary current. In other words, we could simply use the direct energy flow changes, caused by our signal modulations, without adding lots of little unwanted and spurious field changes due to those electron collisions. This notion is simple: use field energy flow to bypass the blocked electron flow, and you bypass much of the noise in the intervening transmission line and associated circuits.

New Areas in Solid State Physics

To comprehend fully some of the content of this paper, a fairly extensive knowledge of quantum solid-state physics is helpful. Even then, using the tantalum electrolytic capacitive material to form and sustain spin density waves at room temperature, and forming an EM field by moving and overlapping the energy states of compressed electrons, appear to be new areas in solid state physics.

This paper will also explain why the AC Josephson tunnel junction effect can be developed at room temperature in the Charged Barrier device, and how and why the AC supercurrent can also be developed at room temperature.

Basic Design Configuration

The simplified schematic of the hybrid Charged Barrier semiconductor is shown in Figure 1. The device has an electrolytic capacitor and a parallel resistor attached to the emitter junction of a bipolar transistor. Such a circuit configuration has been known in textbook theory as a bypass element, and the capacitor in the circuit configuration will react to frequency to lower the emitter resistance and create gain.

However, there is one interesting point to consider. I have been granted two US patents on the same circuit configuration, using an electrolytic capacitor to form a unitary structure. Under certain conditions, electrolytic capacitors react differently in this type of circuit configuration than in a standard non-electrolytic bypass capacitor.

I use the electrolytic capacitor to create a unique electromagnetic field. The parallel resistor is used to 'bleed off' excess charge potential from the plate of the capacitor to generate the electromagnetic field. It also performs another function that I will detail later. The exact values of the capacitive element and resistive element are not listed at this time.

Capacitor Complexities

In theory, a simple capacitor will pass an AC signal and voltage and block a DC voltage from crossing the plate area. However, a physical capacitor is not necessarily simple; instead, it is a complicated system having many internal functions.

An electrolytic capacitor will pass an AC signal and voltage, and also hold a DC charge—with its accompanying DC poten-

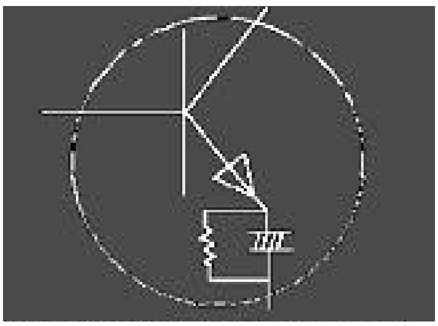

Fig. 1: Schematic for Fogal Charged Barrier Device

tial—on the plate area of the capacitor. If an electrolytic capacitor can hold a DC charge potential on the plate area, then one can move small portions of that charge potential—and that charge—with the use of a parallel bleed-off resistor. This small bleed-off current and change of E-field will create a very small, associated magnetic field on the plate area of the capacitor.

Through experimentation it has been found that this very small electromagnetic field will oscillate at a very high frequency that is not detected under normal test conditions.

Conventional theory has shown that one needs to have a movement of the charge state to generate current to create a magnetic field. However, theory does not tell the exact amount of current needed to create the field.

Could the bleed-off effect from a parallel resistor element change enough of the charge state to sustain a very small EM field? The resistor element would have to have just the right specific value in order to bleed off just enough excess charge potential so that the charge state between the plate of the capacitive element and the resistor bleed-off would not reach a point of equilibrium (equalisation) between the charge states.

Scope Traces

At the point of charge, with no signal applied, and with a bias of the junction, the capacitive element will charge to the voltage potential of 250 mV DC at the emitter junction. The parallel resistor element will work to 'bleed off' excess charge from the capacitor plate area and try to reach a point of equalisation of the charge state. However, the associated field will oscillate at a frequency around 500 MHz and will not reach a point of total equalisation due to this high-frequency oscillation. In other words, equilibrium does not occur.

Formation of Electromagnetic Field

The formation of the electromagnetic field is shown in Figure 2, which is a photograph from a Tektronix transistor curve tracer operating in the microamp region. A reading of the DC operating voltage of the emitter junction of the transistor will not show a change in the voltage potential due to the high-frequency oscillation of the electromagnetic field. At this point, the emitter electrons become trapped and pinned within the electromagnetic field of the capacitor. This pinning blocks current and dampens the amount of electron collision noise and heat due to electron interaction.

Charge Blocking

The photograph in Figure 3 is taken from the Tektronix transistor curve tracer operating in the microamp region. At the point of a small signal injection to the base region of the transistor, the effect of the AC carrier disruption to the internal DC emitter junction electromagnetic field can clearly be seen. This effect is caused by the overpotential of charge state and the compression of the pinned electron clusters within the DC-charged electromagnetic field developed by the capacitor.

At this point in device conduction, the parallel resistor element will try to equalise the field charge and align the pinned electron clusters in the charged field on the capacitor plate. The E-field will start to develop along with its associated Poynting energy density flow (S-flow).

Formation of AC Supercurrent

The photograph in Figure 4, taken from the Tektronix transistor curve tracer, shows the effect to "disruption and compression of the pinned electron clusters".

At this point in time in the semiconductor, the parallel resistor element can no longer handle the bleed-off of excess charge potential from the charged plate of the capacitor, due to the compression of electrons and the consequent rapid formation of an E-field. So there is a build-up of the Poynting energy density flow due to the change in electron energy state and compression of charge clusters. A spin density wave will develop and increase within the tantalum capacitor.

Discharge of AC Supercurrent

The photograph in Figure 5, again taken from the Tektronix transistor curve tracer, shows almost the full development of the AC supercurrent, due to the Poynting energy density flow and the increased spin-density wave action of the tantalum capacitor. The development of the E-field is almost complete.

The emitter junction DC electromagnetic field is about to collapse and release the AC supercurrent as well as the flow of Poynting energy density.

The AC supercurrent is too massive and the increased nature of the spin density wave of the tantalum element is too fast, due to the build-up of the E-field, for the bleed-off resistor to effectively regulate and shut down the action.

Poynting Energy Flow

Taken from the Tektronix transistor curve tracer, the photograph in Figure 6 shows the point of discharge and the Poynting energy density flow, the AC supercurrent, and the collapse of the DC-charged electromagnetic field due to the change of energy state on the plate of the tantalum capacitor.

Most of the device conduction is a Poynting energy density flow across the doped regions of the device's crystal lattice. With a dramatic decrease in electron collisions, the S-flow now is not subject to distortions due to the material defects within the lattice structure. Device switching times are far faster (at optical speed) and there are few, if any, limitations on frequency response.

The phenomenal frequency response—essentially, up to the optical region—follows, since the shortest frequency wavelengths can be passed directly as Poynting energy density flow. Without divergence or scattering of this energy flow, there is no "work" being done in the conventional sense on the non-

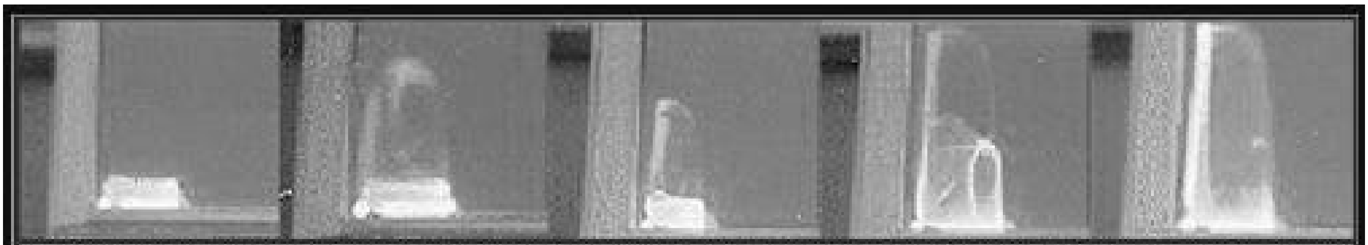

Fig. 2 Fig. 3 Fig. 4 Fig. 5 Fig. 6

translating electrons in that region, even though they are potentialised. That is, electron transport has been halted temporarily or dramatically reduced, while the Poynting flow continues apace.

With most electrons not being translated longitudinally, there is no heat build-up in the device as there is with lattice vibration interactions with a normal electron current.

This device can work as a charge coupled device with the ability to pass both voltage and Poynting current flow, S, rather than conduction electron current flow, dq/dt.

Change of Energy State

Tantalum is one of the elements that is used in the construction of the Charged Barrier device, as well as the parallel resistor element. Under certain conditions, when stimulated with a very small electric current to align the charge state, the excess bleed-off effect due to the parallel resistor can move the charge state on the capacitor and develop a very small electromagnetic field. Electrons are 'held' and 'pinned' within this field to reduce electron lattice interaction within the emitter junction.

With the influence of the AC conduction electrons reacting with the pinned electrons within the charged field, a unique effect will start to happen: the clusters of bound electrons within the charged field are compressed to a point where there is a change of energy state within the compressed, bound electrons in the tantalum lattice. This will start the formation of the E-field due to the interaction of the compressed electron clusters with the influence of the AC conduction electrons.

Remember the magnets, when their like-poles were brought within close proximity to each other? An analogous action will start the formation of the AC supercurrent and the Poynting energy flow within the device.

Charged Barrier Fogal Engine

Putting together all the actions discussed, we may compare the electromagnetic actions to the actions of a special kind of engine cycling, as shown in Figure 7.

Figure 7 shows four analogous actions involved in the Fogal Engine. Figure 7A shows the start of the 'down stroke', so to speak, of the Fogal emitter piston, and the formation of the DC electromagnetic field. Figure 7B shows the signal injection into the cylinder from the injector base region as the emitter piston pulls the signal into the chamber. Figure 7C shows the compression of electron density and the formation of the amplified E-field due to the charge compression, with a resulting expansion of the Poynting energy density flow. Figure 7D shows the point of discharge of the Poynting energy density flow, the resulting AC supercurrent, and the collapse of the DC electromagnetic field of the emitter piston.

Device Wave Function

Though not in conventional theory, signal waves actually travel in wave pairs, each pair containing the familiar wave and an associated 'hidden' antiwave.

The two waves of the pair have the same frequency. Current semiconductor technology cannot separate these wave pairs due to limitations in switching time. The Charged Barrier device can switch at a sufficiently fast rate to:

(i) separate the wave pairs at the higher frequencies, and

(ii) define the polarisation of light waves to show background imaging and enhanced video resolution.

A pre-recorded audio or video tape can be processed to reveal hidden sounds or background imaging that standard electronic equipment will not process. The device has been shown to process frequencies in the range from 20 Hz to 5 GHz and higher, with no loss in frequency response due to the ability of the device to separate and process wave pairs and also due to faster device-switching.

Some Foreseeable Applications

Prototype Charged Barrier devices have been tested in video equipment to process composite video images for a higher resolution. The device has the ability to process and separate the wave pairs and define the polarisation of light from background objects. This ability can produce a high-definition image on a CRT, and a near-holographic image on liquid crystal display (LCD) panels. The clarity of LCD panels can be greatly improved by the switching speed of the Charged Barrier technology, with the visual improvement sometimes being startling.

Encryption & Transmission Capability

A preliminary test was constructed in Huntsville, Alabama, in May 1996, to determine if video information could be infolded within a DC voltage potential and transmitted across a wired medium.

Live video information at 30 frames per second was processed and converted by full wave rectification into a DC potential at a voltage of 1.6 v DC and connected to a twisted-pair wire medium of 2,000 feet in length. As a voltage, the 5 MHz video information rectified to DC potential had no modulation or AC signal present that could be detected by sensitive signal-processing equipment.

The analog oscilloscopes that were used to monitor the transmission could only see the DC voltage flat line, although the best digital storage scope could see very weak signal residues because of slightly less than 100% filtering.

I later performed additional tests with increased filtering, so that the residues could not be seen. These tests were constructed to see if video information could be 'infolded' into an audio carrier and transmitted across an ELF frequency transmission source for communication with submarines, or down a 2,000-foot twisted wire pair.

The Charged Barrier device was able to process the hidden video, due to the ability of

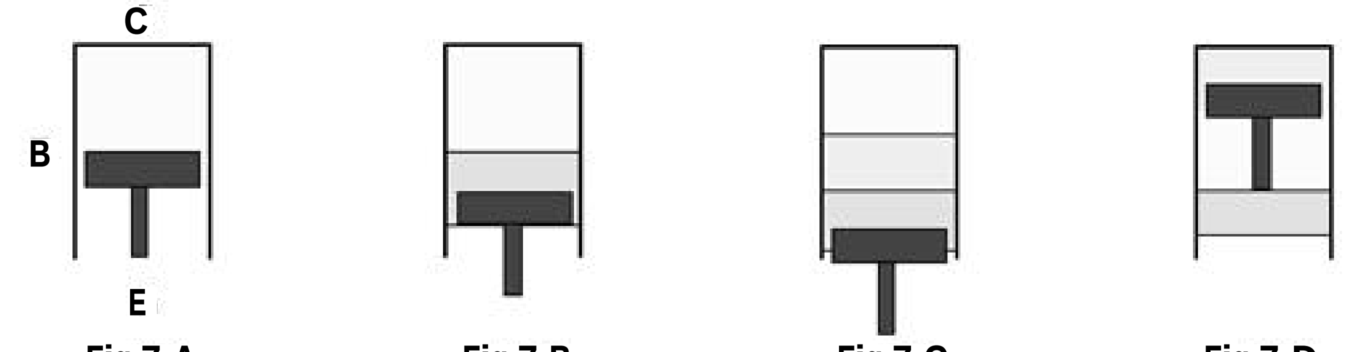

Fig 7-A Fig 7-B Fig 7-C Fig 7-D

the device to sense the infolded AC electromagnetic wave information hidden inside the rectified DC voltage—sensed as a disruption to the internal DC electromagnetic field of the Charged Barrier device.

I have since repeated the test with a better build-up to eliminate the very weak signal residues, and have found the effects are real and replicable. Use of the infolded EM waves in an ELF carrier for video frequency signalling is real.

A novel effect uncovered in the Huntsville tests was that, by adjusting the gain control of the receiving box containing the Charged Barrier device, the focused field of view of the fixed image could be varied, even though no adjustment at all was made in the video camera's stationary focusing. This showed that the 'internal information' in an image actually contains everything needed to scan a fixed volume of space, forward and backward in radial distance, in a focused manner.

The internal information seems to contain information on the entire volume of view of the camera. And it is possible to scan that volume from a seemingly 'fixed' image, where much of the image is out of the camera-focused field of view. The implications for photo analysis are obvious and profound.

Charged Barrier Device Applications

Existing radar technology can be refined and improved with the Charged Barrier device. One of the most complex problems in the industry is the noise content in signal processing. The Charged Barrier device can be used as a front-end, low-noise amplifier and can increase the sensitivity of the target signature scan capability.

Radar imaging could be greatly improved simply by processing the return image with the Charged Barrier device for high-resolution CRTs and LCD panels.

Systems could also be improved for faster targeting and return echo due to the optical speed of the Charged Barrier device switching. By utilising the 'internal' information, it should be possible to develop improved imaging for sonar applications so there will be no gaps in the frequency spectrum.

The ability to get at and detect the hidden internal EM information of an object from its surface reflection is an innate capability of the Charged Barrier device that needs to be explored. It is already well known that the entire interior of a dielectric participates in the reflection of light from it, and that the information on the interior of the reflecting object is in the reflected image, but in the form of hidden EM variables.

Radar & Sonar Imaging Application

A new type of 'volume-viewing' radar system can be constructed with the Charged Barrier technology, that can scan the inner EM signal image produced over a given area or volume and sense disruptions within the Earth's magnetic field.

The movement through that volume of an object (such as a low-flying aircraft made of metal or epoxy resin skin design) can be detected and tracked, regardless of electronic countermeasures and atmospheric disruptions (such as tornadoes, hurricanes, or windshear due to microbursts), without the need for target echo return capability. The Charged Barrier device can sense and amplify very small disruptions to the internal electromagnetic fields and create an image for identification. The volume can be scanned, in focus, back and forth in distance.

For sound direction and distance sensing, the pinna (small folds) of the outer ear use phase reflection information more than 40 decibels below the primary sound signal that strikes the eardrum.

Any target's nonlinearities and defects, regardless of overall reflective angle and reflective sonar signals, also produce such minute, hidden, pinna phase reflections and disturbances in:

(i) sonar reflections,

(ii) the Earth's magnetic field (and, in fact, in the electric field between the surface of the Earth and the electrosphere), and

(iii) in the ocean, in the overall subsurface static potential formed by the conglomerate potentials of the hydrogen bonding, ionisations, etc.

These pinna signals are broadcast through the surrounding normal fields/potentials of the Earth, including underneath the ocean, although they are many dB below the normal field fluctuations whose gradients are detected by normal sensors. By detecting this 'internal' information, Charged Barrier detectors would be able to detect these hidden pinna signals and dramatically increase the information available to the sensor system.

Terrain-following cruise missiles, for example, could be detected, tracked and identified by this means, as could submarines, floating subsurface mines, etc. Field camouflage and decoying would be essentially useless against such sensors.

A New Revolution in Electronics

The Charged Barrier technology is an innovation which calls for using the energy flow in circuits that is already

(i) extracted from the vacuum flux, and

(ii) freely provided to the external circuit by the source dipoles.

It utilises an extended electromagnetics that includes a higher topology and a new, inner, 'hidden variable' EM. This 'inner EM' has been in the literature for nearly a hundred years—but ignored. The use of the Charged Barrier technology will expose many of the present shortcomings in EM theory and models, but it should also lead to a corrected, highly extended electromagnetics.

Now that you know the theory behind how this technology works, be aware that you still need the exact design parameters and component tolerances in order to duplicate the technology.

Let us hope that the Charged Barrier technology can receive the full scientific attention, testing and theoretical modelling that it deserves. With that attention and examination, I believe this technology will usher in a new revolution in electronics.

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